

EGR quantity equal to the base internal EGR quantity without modification when there is no valve overlap between an exhaust valve opening period and an intake valve opening period; and to determine the estimated internal EGR quantity by modifying the base internal EGR quantity with a valve overlap condition of the engine when there is a valve overlap.

52. (New) The apparatus as claimed in Claim 48, wherein the means for calculating the estimated internal EGR quantity includes means for using, as the exhaust valve closing timing, a target exhaust valve closing timing, for calculating the estimated internal EGR quantity.

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53. (New) The apparatus as claimed in Claim 48, wherein the means for calculating the estimated internal EGR quantity includes means for calculating a base internal EGR quantity in accordance with the exhaust valve closing timing and the engine speed; for setting the estimated internal EGR quantity equal to the base internal EGR quantity without modification when there is no valve overlap between an exhaust valve opening period and an intake valve opening period; and for determining the estimated internal EGR quantity by modifying the base internal EGR quantity with a valve overlap condition of the engine when there is a valve overlap.

54. (New) The apparatus as claimed in Claim 48, wherein the apparatus further comprises means for calculating an engine cylinder intake air quantity in accordance with the estimated internal EGR quantity.